Operating Instructions

Elmasonic S

Ultrasonic Cleaning Units

• english •

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1 General

The present Operating Instructions are part of the delivered equipment. They must be ready for use at any time and remain with the unit in case of resale.
Carefully read the Operating Instructions before using of the unit and operate the electrical appliance according to the instructions.
We reserve the right to carry out technical modifications on the unit due to advanced development.
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2 Important safety warnings

Read before initial operation!

Intended use

The present Elma ultrasonic cleaning unit has been designed for the treatment of **items** and **liquids** only.

No cleaning of living beings or plants!

User

The unit must be operated by instructed staff. Do not let children operate the unit.

Mains connection

For safety reasons, the present unit must be connected to a correctly grounded socket only. The technical details indicated on the nameplate must correspond with the available mains connection details, in particular those of the mains voltage and current connected value.

Prevention of electrical accidents

The unit must be opened by authorised specialised personnel only.

For purposes of maintenance and care of the unit, in case of suspected humidity inside the unit or in case of malfunctions and after operation pull the mains plug.

Cleaning liquid

Fill the unit with a sufficient quantity of cleaning liquid before switch-on. Flammable liquids must not be treated by ultrasound directly in the cleaning tank: risk of fire and explosion!

Hot surfaces and liquids

Risk of burning and scalding! Depending on the operational period of the unit, unit surfaces, cleaning liquid, basket and cleaning items can heat up considerably.

Noise emission

Ultrasonic units can produce annoying sounds.
Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover.

Sound transmission at physical contact

Do not reach inside the cleaning liquid or touch sound-carrying parts (tank, basket, cleaning items, etc.) during operation.

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Exclusion of liability

The manufacturer cannot be held liable for damages on persons, equipment or cleaning items caused by improper use. The operator is responsible for the instruction of the operating staff.

3 Functioning

Today, cleaning by ultrasound is the most modern fine cleaning method.

The electric high-frequency energy created by an ultrasonic generator is transformed into mechanical energy by piezo-electrical transducer systems and is then transmitted into the bath.
This process creates millions of tiny vacuum bubbles which implode due to the variations of pressure caused by the ultrasonic activity. Highly energetic liquid jets are created. These jets remove dirt particles from surfaces and even from the smallest grooves and bores.

3.1 Ultrasonic cleaning factors

Basically, the cleaning result depends on four factors:

Mechanical energy

Ultrasonic energy is probably the most important mechanical factor in the cleaning process. This energy must be transmitted through a liquid medium to the surfaces which are to be cleaned.

The present Elmasonic unit is fitted with the innovative sweep function device: electronic oscillation of the sound field (sweep function) prevents the formation of zones of low performance in the ultrasonic bath.

Cleaning media

For saponification and removal of the dirt particles a suitable cleaning agent is required. Elma has a large range of cleaning media on offer.

Cleaning chemicals are also necessary to reduce the surface tension. This increases considerably the efficiency of the ultrasonic activity.

Temperature

The effect of the cleaning medium is improved by the optimised temperature of the cleaning liquid.

For Elma cleaning products please observe the instructions given on the label or the product information leaflets.

Cleaning period

The cleaning period depends on the degree and the kind of contamination and on the correct selection of ultrasonic energy, cleaning agent and temperature.

4 Product description

4.1 Elmasonic S product features

- cleaning tank made of cavitation-resistant stainless steel
- casing made of stainless steel, hygienic and easy to clean.
- high performance sandwich transducer systems.
- sweep function for an optimised sound field distribution in the cleaning liquid.
- degas function for the efficient degassing of the cleaning liquid and for laboratory purposes.
- auto degas function for automatic degassing cycles, i.e. with fresh cleaning liquids.
- quick-drain valve on the back of the unit (from Elmasonic S 30).
- dry-run protected heating*.
- temperature-controlled ultrasonic operation*: the cleaning process starts automatically when the set temperature is reached; the cleaning liquid is regularly mixed during the heating up so that the cleaning liquid is evenly heated
- automatic mixing during heating-up period*.
- plug-in mains supply (Elmasonic S 10 – S 300 H).
- electronical turning knobs.
- display of both set values and actual values via LED settings (from Elmasonic S 15).
- splash-water-proof operating panel.
- plastic carrying handles.
- automatic switch-off after 12 h operation to prevent unintended permanent operation.

* only models equipped with heating

4.2 CE conformity

The present Elma ultrasonic unit is in compliance with the CE marking criteria according to the EMC directive 89/336/EEC, and the low voltage directive 73/23/EEC.
The declaration of conformity is available from the manufacturer.

4.3 Delivered equipment

- Ultrasonic cleaning unit
- Mains cable
- Tube socket with tube clamp (from S 30)
- Operating Instructions

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4.4 Unit front view / side view

Illustration 4.4 Front view / side view Elmasonic S 30 H

A **Filling line** (not available on Elmasonic S 10 / S 10 H) indicates the recommended maximum filling level. This level should not be exceeded even with cleaning items inside.

B **Plastic carrying handles** (from Elmasonic S 30) for the safe transportation of the unit even with hot casing.

C **Turning knob for the draining of the tank** (from Elmasonic S 30) functional description *see section 4.6.*

D **Operating panel** for the control of the operating functions. Description see *section 4.7 and 4.8.*

4.5 Unit back view

Illustration 4.5 Unit back view (as delivered)

A **Liquid drain duct** for draining the tank (up from S 30)

B **Mains supply socket** for quick and easy removal of the mains cable e.g. for transportation purposes

4.6 Turning knob for draining the tank (from S 30)

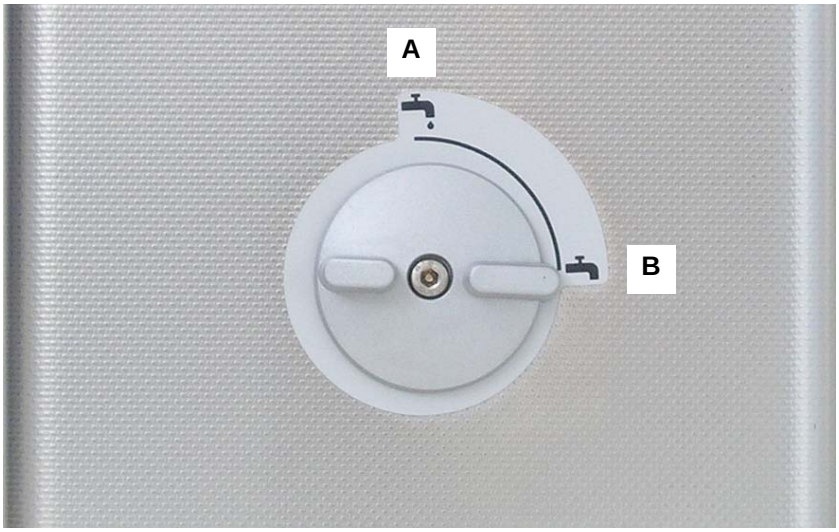

Illustration 4.6 View turning knob for draining the tank

A **Vertical position**: drain open

B **Horizontal position**: drain shut

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4.7 Description of operating elements S 15 – S 900 H

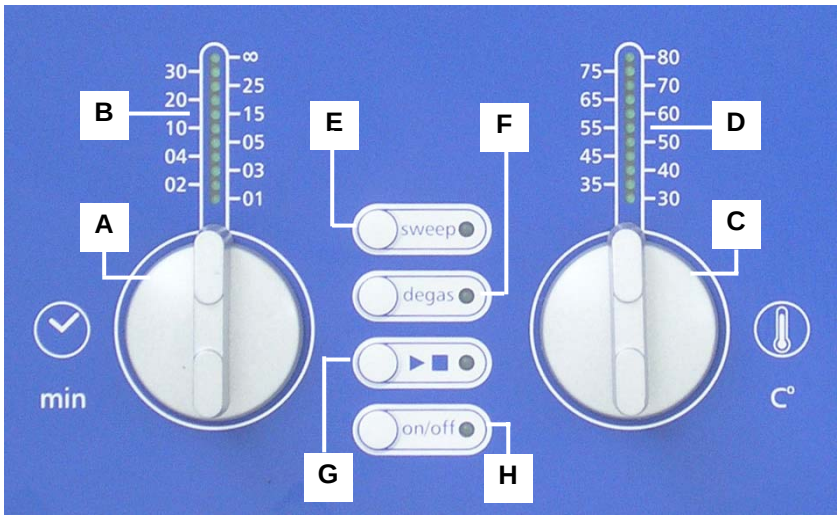

Illustration 4.7 View operating elements (unit with heating)

A **Turning knob cleaning period ***
Setting options for short-period operation: 1; 2; 3; 4; 5; 10; 15; 20; 25; 30 min (with automatic switch-off).
Permanent position ∞ for continued operation. Here the unit must be switched off by hand.
For safety reasons the unit is automatically switched off after 12h permanent operation.

B **LED display cleaning period** indication of set period and remaining period. Not available on Elmasonic S 10 / S 10 H.

C **Turning knob temperature *** (applies only for units with heating) temperature range variable in 5°C steps from 30° up to 80°C.

D **LED display temperature** (applies only for units with heating) indication of set value and actual value of liquid temperature. Not available on Elmasonic S 10 / S 10 H.

E **Key sweep function** for an optimised sound field distribution in the cleaning liquid; Sweep LED.

F **Key degas function** (manual and auto degas – *see chart 4.9*) for the efficient degassing of fresh cleaning liquid and for special applications in the laboratory; Degas LED.

G **Key start/stop for ultrasonic operation** and temperature-controlled operation. Ultrasonic LED (not available on Elmasonic S 10 / S 10 H)

H **Key on/off** for switching the unit on and off; on/off LED

* for setting the value: turn knob **clockwise**
for resetting the value: turn knob **anti-clockwise**

4.8 Description of operating elements S 10/ S 10 H

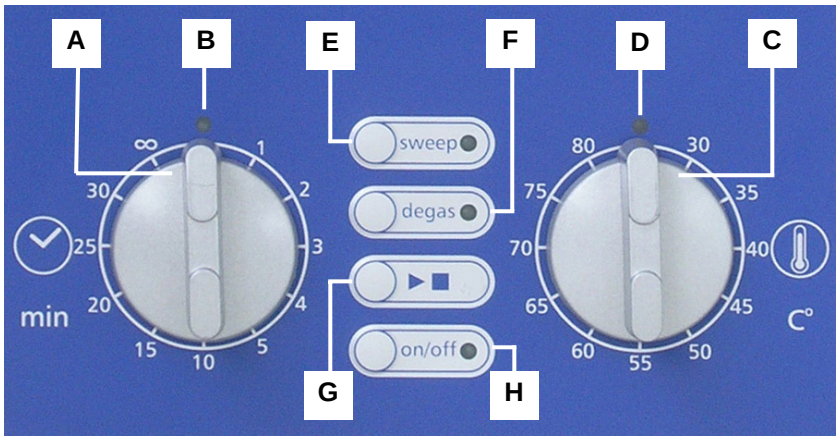

Illustration 4.8 View operating elements S 10 H

Functions as on Elmasonic S 30 – S 900 H (*see section 4.7*) with the following exceptions:

B **Ultrasound LED** indicates ultrasonic operation

D **Temperature LED** (applies only for units with heating) indicates heating operation

4.9 Operating and display functions

Please note: specific displays of unit types S 10 / S 10 H and S 15 – 900 H are marked separately.

Action	Setting	Result	Display
switch on unit	press on/off key	unit is ready for operation	on/off LED is on
switch off the unit	press on/off key	unit is switched off	all displays are off
start ultrasound - now -	select period by turning knob for cleaning period press key ▶■ (ultra-sound)	ultrasound is operating	ultrasound LED is on **S 15 – S 900 H**: set period LED is on remaining period LED blinks (only in timer operation)

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Action	Setting	Result	Display
start ultrasound - temperature-controlled*; with mixing of cleaning liquid – * if set temperature > actual temperature; applies only for units with heating	set period set temperature by turning knob for temperature keep key ►■ pressed for > 2 sec	heating operates ultrasound is started automatically after reaching the set temperature set period ultrasound runs down	ultrasound LED blinks **S 10 H**: ultrasound LED blinks until the set temperature is reached; the LED is on as soon as the ultrasound is activated **S 15 H – S 900 H**: set period LED blinks as soon as the set temperature is reached the ultrasound LED is on set period LED is on remaining period LED blinks
stop ultrasound before end of set period	turn set period to 0 or press key ►■	ultrasound switched off	ultrasound LED is off **S 15 – S 900 H**: set period LED is on
switch on heating* * applies only for units with heating	select set temperature	heating operates	**S 10 H**: temperature LED is on; it moves out when the set temperature is reached **S 15 – S 900 H**: set temperature LED is on actual temperature LED blinks and goes towards set temp. as soon as actual temp. = set temp., only the set temp. LED is on if actual temperature > set temperature, the temperature LED starts blinking again

Action	Setting	Result	Display
switch off heating by hand	turn set temperature to position „0“	heating switched off	**S 10 H**: temperature LED is off **S 15 – S 900 H**: set temperature LED blinks
switch on sweep function* * sweep and degas cannot be operated at the same time	select set period press key ►■ press key sweep	ultrasound operates in sweep mode	sweep LED is on ultrasound LED is on **S 15 – S 900 H**: set period LED is on remaining period LED blinks
switch off sweep function	press key sweep	sweep function is switched off ultrasound continues in standard operating mode	sweep LED is off ultrasound LED is on **S 15 – S 900 H**: set period LED is on remaining period LED blinks
switch on degas function* * sweep and degas cannot be operated at the same time	select set period press key ►■ press key degas	ultrasound operates in degas mode	degas LED is on ultrasound LED is on **S 15 – S 900 H**: set period LED is on remaining period LED blinks
switch off degas function	Press key degas	degas function is switched off ultrasound continues in standard operating mode	degas LED is off ultrasound LED is on **S 15 – S 900 H**:set period LED is on remaining period LED blinks
switch on auto degas function* * sweep and degas cannot be operated at the same time	press key ►■ keep degas key pressed > 2 sec	ultrasound operates in auto degas mode for 10 minutes and then switches off	degas LED blinks ultrasound LED blinks

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5 Initial operation

Packing

Please keep the original packing or dispose of it according to the relevant waste disposal regulations. You can also return the packing to the manufacturer free destination (to your account).

Check for transport damages

Check the Elmasonic S for possible transport damages before initial operation. In case of visible damage do not connect the unit to the mains. Contact your supplier and forwarding agent.

Placement

For operation, place the unit on a dry and solid surface. Ensure that the workplace is sufficiently ventilated!

Do not use a soft surface (e.g. a carpet) as this may impede the ventilation of the unit.

CAUTION

Risk of electrocution due to humidity inside the unit!
Protect the unit from entering humidity.

The unit inside is splash-water-proof. Keep workplace and casing dry in order to prevent electrical accidents and damages on the unit.

Ambient conditions

- Allowed ambient temperature during operation: +5°C - +40°C
- Allowed relative humidity of air during operation: max. 80%
- In-door operation only

5.1 Set up of the liquid drain (S 30 – S 900 H)

On the delivered unit, the drain duct for the cleaning liquid is closed off with a plastic screw cap.

For setting up the liquid drain fix the delivered tube socket to the drain duct.

Proceed as follows

1. Unscrew (clockwise) the plastic screw cap *(see illustration 5.1)*
2. Screw the tube socket (included in delivery) onto the inside thread of the drain duct (anti-clockwise).
3. Turn the tube socket into the required drain position *(see illustration 5.2)*.
   The plastic thread is self-sealing when the socket has been screwed in by hand as far as possible.
   Note: Unscrewing the tube socket (anti-clockwise) can cause a leak of the thread.

4. The drain duct is now ready for connection to a customer-provided discharge system. Use a standard tube (dia 1/2"). Push the tube onto the socket and fix it with the clamp included in the delivery.

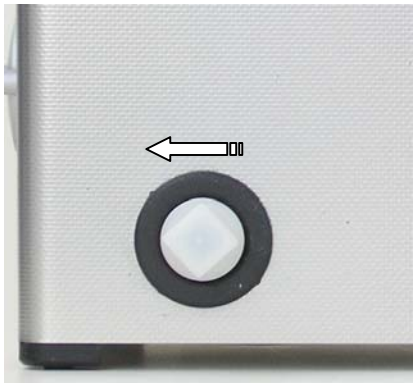

Illustration 5.1
Drain with plastic screw cap

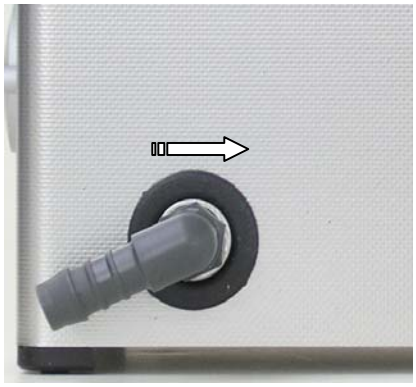

Illustration 5.2
Drain fitted with standard tube

5.2 Connecting the unit to the mains

Required mains conditions

Earth grounded socket:
1 phase (220-240 or 100-120V); 1 N; 1 PE protective earth.

Elmasonic S 450 H / S 900 H in countries with 100V / 115 V mains:
2 phases (100 or 115V); 1 N; 1 PE protective earth.

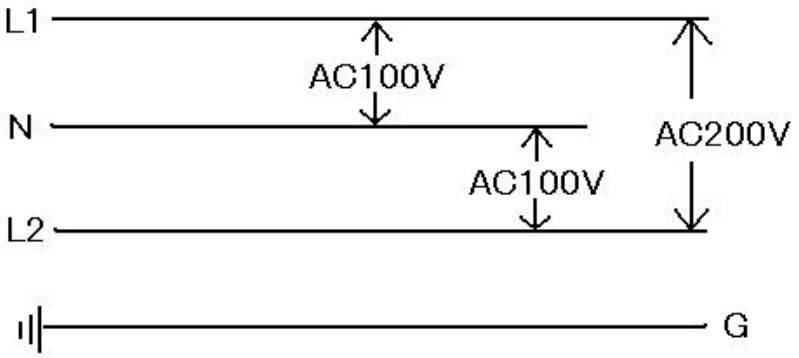

Diagram: required mains conditions for S 450 H / S 900 H in 100 V and 115 V mains.

Connect mains cable

Use the plug-in mains cable delivered with the unit. Connect the unit to a grounded shockproof socket only. Ensure that the values indicated on the nameplate of the unit must correspond with the available connecting conditions.

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6 Putting unit into operation

6.1 Filling of the unit

Shut the drain

Shut the drain duct before filling the tank. (Turning knob for draining of the tank into horizontal position (*see section 4.6*).

Observe filling level

Fill the cleaning tank with a sufficient quantity of a suitable cleaning liquid before switch-on.

The optimum filling level is approx. 2/3 of the tank volume.

The marked maximum filling level of the tank (not available on S 10 / S 10 H) indicates the recommended filling level with cleaning items in the bath (*see also section 4 Illustration 4.4*).

Suitable cleaning agents

Ensure that the chosen cleaning agent is suitable for treatment in an ultrasonic bath and observe the instructions on dosage and the compatibility of the material.
We recommend the use of the cleaning agents listed in *section 8.3.*

Prohibited cleaning agents

Flammable products are generally not allowed for use in an ultrasonic bath. Observe the safety warnings given in *section 8.1.*

CAUTION

Risk of fire and explosion!

Never use flammable liquids or solvents directly in an ultrasonic cleaning bath.

Use the cleaning chemicals listed in *section 8.3*.

Ultrasonic activity increases the vaporisation of liquids and creates a very fine mist which can catch fire on any ignition source.
Observe the instructions on limitations of use given in *section 8.1.*

NOTE

Risk of damage to the transducer tank!

Do not use any acid cleaning agents (pH value < 7) directly in the stainless steel tank if the cleaning items or the contamination of the cleaning items contain halogenides (fluorides, chlorides or bromides). The same applies to NaCl solutions.

Use the cleaning chemicals listed in *section 8.3*.

The stainless steel tank can be destroyed by crevice corrosion in a very short time. Substances that cause crevice corrosion can be contained in household cleaners.

Observe the instructions on limitations of use given in *section 8.2.*

For queries please contact the manufacturer or your supplier.

6.2 Placement of cleaning items

Caution! The ultrasonic bath has been designed for the ultrasonic treatment of items and liquids only.
Do not clean living beings or plants!

NOTE

Do not reach inside the tank during ultrasonic operation!

Cell walls can be damaged by prolonged exposure to ultrasonic activity.

For placing and taking out the cleaning items always switch off the unit.

No cleaning items on the bottom of the tank

Do not place the cleaning items directly onto the bottom of the cleaning tank, as this might lead to damages to the unit.

Use cleaning basket

Place the cleaning items into the stainless steel cleaning basket (accessory equipment).

Acid tank

For the use of cleaning chemicals which might destroy or damage the stainless steel tank use a separate container. For the special plastic cleaner tank for acid chemicals please contact your supplier.

6.3 Degassing of liquid

Freshly mixed cleaning liquids are saturated with air which lessens the cleaning effect of the ultrasonic activity. By sonification of the liquid over a period of several minutes before the cleaning process the tiny air bubbles in the liquid are eliminated.

Degas key

Degas the fesh cleaning liquid for approx. 5 - 10 minutes. For switch-on and switch-off press the degas key.

Auto degas

The Elmasonic S units are equipped with an auto degas option. When the programmed period has finished, the degas function is automatically switched off (10 min).

How to proceed

See chart 4.9.

Degas and sweep functions cannot be operated at the same time.

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7 Ultrasonic cleaning process

Please observe the following instructions before starting the ultrasonic cleaning process.

It is the user's responsibility to check the cleaning results.

CAUTION

Risk of scalding by hot surfaces and cleaning liquid!

Ultrasonic energy is physically transformed into heat.

The unit and the cleaning liquid in the tank heat up during ultrasonic operation even with the heating switched off. During permanent operation with cover temperatures exceeding 60°C can be reached.

During permanent operation with cover and heating temperatures exceeding 80°C can be reached.

Do not reach inside the bath.
If necessary touch unit and basket with protecting gloves!

NOTE

Ultrasonic units can produce annoying sounds.

Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover.

NOTE

Sensitive surfaces can be damaged when exposed to ultrasound over prolonged periods, particularly at low cleaning frequencies.

Ensure that sensitive surfaces are exposed to ultrasonic acitivity for a suitable period only.

If in doubt check the cleaning progress regularly and observe the state of the surface material.

NOTE

Ultrasonic energy is physically transformed into heat.

The unit and the cleaning liquid in the tank heat up during ultrasonic operation even with the heating switched off. During permanent operation with cover temperatures exceeding 60°C can be reached.

For the cleaning of temperature-sensitive items please take into consideration the heating-up of the cleaning liquid.

Please observe that the temperature of the cleaning media remains below 42°C when cleaning parts contaminated with fresh protein or blood.

7.1 Heating up of the cleaning liquid (units with heating)

Depending of the degree and kind of contamination and on the cleaning medium used it might be required to heat up the cleaning liquid. For a quick heating-up process and in order to prevent unnecessary energy losses we recommend to use a cover (optional accessory equipment).

The ultrasonic energy is transformed physically into heat. Low set temperatures can be exceeded during ultrasonic operation.

The cleaning effect through ultrasonic cavitation is reduced when cleaning with high temperatures. We recommend not to exceed a temperature of 80°C inside the tank.

For the recommended cleaning temperature please observe the product information of the used elma clean cleaner.

CAUTION

High temperatures! Risk of burning and scalding!

Cleaning liquid, cleaning tank, casing, lid, basket and cleaning items can heat up considerably.

Do not reach inside the bath.
If necessary wear protective gloves when touching unit and basket!

NOTE

Cleaning temperature recommendations in the medical sector:

Please observe that the temperature of the cleaning media remains below 42°C when cleaning parts contaminated with fresh protein or blood.

Please observe the temperature even when using low or no heating.

How to proceed

Press the on/off key to start the unit.

Heating control by turning temperature knob

Select the required cleaning temperature by turning the temperature knob.

S 10 H: LED display is on and indicates heating operation.
S 15 H – S 900 H: The set temperature is indicated by the permanently lighting LED.

The heating is operated until the set temperature is reached.

S 15 H – S 900 H: The LED display also indicates the actual temperature by a blinking light (not on S 10 H).

As soon as the actual temperature is equal to or higher than the set temperature, the heating switches off.
S 10 H: LED display off.
S 15 H – S 900 H: the corresponding LED lights permanently.

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7.2 Temperature-controlled cleaning (units with heating)

Functioning

Elmasonic S units are equipped with an additional temperature-controlled cleaning function. The cleaning process is automatically started as soon as the required bath temperature is reached.

How to proceed

1. press the on/off key to start the unit.
2. select the required temperature.
3. set the required ultrasonic cleaning period.
4. keep the start/stop key pressed > 2 sec:
   The unit starts heating up.
   During the heating-up process the ultrasound is regularly activated to mix the liquid.
   When the set temperature is reached the ultrasound is switched on for the duration of the set cleaning period.

When the set cleaning period has run down, the ultrasonic activity switches off automatically. The heating continues operating at the set temperature.

7.3 Automatic mixing of the liquid during heating up (units with heating)

Without mixing of the liquid the generated heat will rise to the surface of the bath. This will cause a strong gradient of temperature inside the cleaning tank. In order to ensure an even heating-up of the cleaning liquid, it makes sense to mix the liquid from time to time, e.g. by means of ultrasound.

Elmasonic S units are equipped with an additional mixing device which guarantees the optimum mixing of the cleaning liquid during the heating up process.

Functioning

The ultrasound is activated for operating periods of approx. 5 seconds each with one-minute breaks in between.

How to proceed

1. press the on/off key to start the unit.
2. select the required cleaning period (set period)
3. set the required temperature
4. to start keep the ►■ key pressed for > 2 sec

(*see chart 4.9*)

Operation only when set temperature > actual temperature

7.4 Starting the cleaning process manually

Press the on/off key to start the unit.

Select the cleaning period

Set the required cleaning period with the turning knob.
S 10: LED display is off.
S 15 – S 900 H: The LED display indicates the set period.

Short period operation

For short period operation set the required cleaning period at the turning knob.

Press the ►■ key to start the ultrasonic operation.

The unit starts the ultrasonic cleaning process.
S 10: LED display is on.
S 15 – S 900 H: The remaining period is indicated in the blinking LED display.

The ultrasound is automatically switched off when the set period has run down.

Permanent operation

For permanent operation turn the turning knob clockwise into ∞ position. In this operating mode there is no automatic switch-off. The ultrasonic activity must be switched off by hand after the cleaning process has been finished; press the ►■ key to switch of. Alternatively, turn the turning knob back into “0” position.

Caution: Turn the turning knob only anti-clockwise into “0” position!

In order to avoid unintended permanent operation, the Elmasonic S units are equipped with a safety switch-off automatically. The unit switches off completely after 12 h permanent operation. In case you wish to continue operation start the unit again.

7.5 Sweep function

Elmasonic S units are equipped with an optional sweep function.

Functioning

A more homogeneous sounding of the cleaning bath is achieved by the continued displacement of the sound pressure maxima in the cleaning liquid.

Particularly for large cleaning items it may be useful to switch on the sweep function.

How to proceed

Press the sweep key to switch on or off.

Sweep and degas functions cannot be operated at the same time.

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7.6 After the cleaning

Follow-up treatment of cleaning items

When the cleaning process is finished rinse the cleaning items, e.g. under the tap.

Drain the unit

Drain the liquid as soon as it is dirty or when the unit is not operated over a prolonged period of time. Certain residues and types of contamination may destroy or damage the stainless steel tank.

Use the quick-drain duct to drain the cleaning tank (*see section 4.9*).

8 Cleaning media

The cleaning chemical to be used must be suitable for the use in an ultrasonic bath to prevent damage to the tank or injuries to the user. Use the recommended cleaners mentioned in *section 8.3*. Observe the restrictions to cleaners containing solvents and aqueous cleaners mentioned *in sections 8.1 and 8.2.*

For queries please contact the manufacturer or your supplier.

Exclusion of liability

Damages caused by non-compliance with the instructions given in *sections 8.1 and 8.2* will not be covered by the manufacturer's warranty!

8.1 Limitations of use of cleaners containing solvents

Caution! Never use flammable liquids or solvents directly in an ultrasonic cleaning tank. Risk of fire and explosion!

Ultrasound increases the volume of vaporisation of liquids and creates a very fine mist that can catch fire on any ignition source at any time.

Do **not** fill potentially explosive substances and flammable solvents

- marked in compliance with the EEC directives by symbols and safety warnings R 1 to R 9
- or E, F+, F, O or R 10, R 11 or R 12 for flammable substances

into the stainless steel tank for ultrasonic treatment.

Exception

In compliance with the general regulations on the protection of labour, certain limited volumes of flammable liquids (max. 1 litre) can be used in an ultrasonic cleaning unit under the following conditions: these liquids must be filled into a suitable

separate vessel (e.g. beaker) with sufficient ventilation; this vessel (beaker) can then be put into the stainless steel tank which is filled with non-flammable liquid (water with a few drops of interlacing agent).

8.2 Limitations on aqueous cleaners

Do not use aqueous cleaning media with pH values in the acid range (pH < 7) directly in the ultrasonic tank if fluoride (F^-), chloride (Cl^-) or bromide (Br^-) ions can be taken in by the removed dirt or through the cleaning chemical. These can destroy the stainless-steel tank by crevice corrosion within a very short period of ultrasonic operation.

Acids and alkaline solutions

Other media which can destroy the stainless-steel tanks when used in high concentrations or with high temperatures during ultrasonic operation are: nitric acid, sulphuric acid, formic acid, hydrofluoric acid (even diluted). (Completeness of list not guaranteed.)

Risk of damage to the unit: do not use cleaning solutions containing more than 0.5 mass % alkali (KOH and/or NaOH) in an ultrasonic cleaning tank.

Entrainment of chemical substances

The above limitations for the use of chemicals in an ultrasonic bath also apply for the aforementioned chemicals when these are brought into an aqueous (particularly distilled water) bath through entrainment or from the removed dirt.

Acid-resistant tank

For the ultrasonic treatment with the above mentioned media use an acid-resistant tank (available as accessory equipment).

Disinfectants

The limitations of use also apply to the standard cleaners and disinfectants if these contain the above mentioned compounds.

Safety regulations

Observe the safety warnings indicated by the manufacturer of the chemicals (e.g. goggles, gloves, R and S phrases).

For queries please contact the manufacturer or your supplier.

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8.3 List of recommended cleaning media

Elma has a large range of suitable cleaning products on offer developed by chemical engineers in the Elma laboratory. Please contact your supplier to find the most suitable cleaning chemical for your application.

Environment – friendly products

The organic detergents contained in the elma clean cleaning concentrates are biodegradable. Product informations and safety data sheets are available from the manufacturer.

8.3.1 Dental

elma clean 10

Universal cleaning concentrate for the cleaning of instruments and laboratory equipment made of plastic, ceramic, stainless steel, rubber and glass.

elma clean 25

Ready-to-use cleaner for impression spoons: removes dental plaster and alginates. Ready-for-use cleaning bath.

elma clean 35

Cleaning concentrate for prostheses with activated oxygen for the cleaning of dental prostheses made of metal, ceramcis and plastic. The released oxygen refreshes the prosthesis hygienically.

elma clean 40

Chemical cleaning concentrate for the removal of cement and carbonate (lime). For the cleaning of precious metals, ceramics, plastics, glass and rubber. Removes metal oxide, cement, fluxing media, etc.

elma clean 50d

Aldehyde-free, ready-to-use drill cleaner for instruments made of stainless steel. For the hygienical removal of amalgam remains, blood, tissue, etc.; with anti-corrosion effect.

elma clean 60

Acid cleaning concentrate for instruments made of stainless steel, glass and plastic. Removes corrosion, rust films and mineral deposits.

8.3.2 Medical

elma clean 10

Universal cleaning concentrate for the cleaning of instruments and laboratory equipment made of plastic, ceramic, stainless steel, rubber and glass.

elma clean 60

Acid cleaning concentrate for instruments made of stainless steel, glass and plastic. Removes corrosion, rust films and mineral deposits.

8.3.3 Optics

elma opto clean Cleaning concentrate for glasses, frames, optical lenses and components. Also suitable for plastics.

8.3.4 Laboratory

elma clean 60 Acid cleaning concentrate for instruments made of stainless steel, glass and plastic. Removes corrosion, rust films and mineral deposits.

elma clean 65 Neutral laboratory and universal cleaning concentrate for glass, plastic, metals and rubber.

elma clean 70 Alkaline laboratory cleaning concentrate for equipment made of glass, metal, alkali-proof plastics, rubber and ceramics. Removes dust, grease, oil, soot, etc.

elma clean 75 Ammoniacal cleaning concentrate with brightening effect for precious and nonferrous heavy metals; for the removal of abrasive and polishing pastes.

8.3.5 Jewellery

elma clean 75 Ammoniacal cleaning concentrate with brightening effect for precious and nonferrous heavy metals; for the removal of abrasive and polishing pastes. Not suitable for soft stones, pearls or corals.

elma clean 85 Gentle, neutral cleaning concentrate for the jewellery workshop. Suitable for soft stones and fancy jewellery.

elma noble clean Cleaning and brightening of gold, silver and platinum jewellery within seconds. Not suitable for soft stones, pearls or corals. Ready-to-use cleaner.

elma ultra clean Extra gentle, mild alkaline cleaning concentrate for precious metal jewellery, in particular gold and gold-alloys will be given a new shine, with stones. Clean soft stones without ultrasound.

elma super clean Ammoniacal cleaning concentrate for jewellery made of precious metals, with brightening effect. Clean soft stones without ultrasound.

8.3.6 Watches

elma chrono clean 1:20 Neutral concentrate for the aqueous cleaning of disassembled watches / clocks; removes resin residues and rust.

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elma cleaning-concentrate 1:9	Ammoniacal aqueous cleaning concentrate for disassembled watches / clocks with brightening effect onnon-ferrous parts.

8.3.7 Industry and workshop

elma tec clean A1	Cleaning concentrate (alkaline)for electronics and fine optics: removes light oils, grease, fluxing agents, dust, finger prints, etc.
elma tec clean A2	Intensive cleaner (ammoniacal) with brightening effect for nonferrous and precious metals: removes grinding, polishing and lapping media, grease, oil, etc.
elma tec clean A3	Cleaning concentrate (alkaline) for iron, steel, stainless steel and precious metals: removes punching oil, drawing grease, soot, forge, grinding and polishing media, high-performance cooling lubricants, etc.
elma tec clean A4	Universal cleaning concentrate (alkaline): removes oil, grease, soot, coking, forge, dust, finger prints, etc.
elma tec clean A5	Powerful cleaner (alkaline) in powder form for iron and light metals: removes forged and gummed oil and grease, grinding and polishing media, lacquer and paint remnants, wax, etc.
elma tec clean N1	Neutral cleaning concentrate: removes oil, grease, grinding, lapping and polishing media, dust, sweat, finger prints, etc.
elma tec clean S1	Mild acid cleaning concentrate: removes rust, lime, oxide films (e.g. verdigirs), grease, oil, etc.
elma tec clean S2	Strong acid cleaning concentrate: removes mineral contaminations such as lime, rust and other oxides, films that can be removed with corrosives, etc.

9 Maintenance

9.1 Maintenance / Care

Pull the mains plug before carrying out any maintenance works!

Electrical security

The present Elmasonic S unit is maintenance-free.
Check the casing and the mains cable for damage regularly in order to prevent electrical accidents.

Care of transducer tank

Lime deposits on the stainless-steel tank can be cleaned gently e.g. with elma clean 40 or elma clean 115C (operate the unit with concentrate + water).

Grid of air fan

Check regularly the grid of the air fan at the bottom of the unit (not existent in all units).

Remove dirt if necessary to allow sufficient ventilation inside the unit.

Care of casing

Residues of cleaning media can be wiped away with a household cleaner or decalcifier depending on the kind of contamination. **Do not put the unit in or under water!**

Disinfection

If the unit is used for medical and sanitary purposes it is necessary to disinfect the transducer tank and the surfaces regularly (standard surface disinfectants).

9.2 Service life of the transducer tank

The transducer tank and particularly the ultrasound transmitting surfaces are wear parts. The changes on the surfaces that occur after a certain operating period are visible first as grey areas and later on as material abrasions, the so-called cavitation erosion.

Elma already uses a highly cavitation-resistant special steel. To prolong the service life of your ultrasonic unit even more we recommend to observe the following instructions:

- Regularly remove any cleaning residues, in particular metal particles and rust films.
- Use suitable cleaning chemicals, with particular caution concerning the kind of removed contamination (see instructions *section 8.2*).
- Exchange the cleaning medium before it is too heavily contaminated.
- Do not operate the ultrasound unnecessarily; switch off after the cleaning process.

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9.3 Repair

Opening by authorised specialised personnel only

Repair and maintenance works which require the unit to be connected and opened must be carried out by authorised and specialised personnel only.

CAUTION

Risk of electrocution due to live parts inside the unit!

Pull the mains plug before opening the unit!

The manufacturer cannot be held responsible for any damage caused by unauthorised maintenance or repair works on the unit.

In case of a break-down of the unit please contact the manufacturer or your supplier.

10 Technical details

	Tank max. volume (approx. litre)	Tank effective volume (approx. litre)	Tank internal dimensions W x D x H (approx. mm)	Unit external dimensions W x D x H (approx. mm)	Basket internal dimensions W x D x H (approx. mm)	Weight (approx. kg)
S 10 **S 10 H**	0,8	0.7	190x85x60	206x116x178	177x73x30	2,0
S 15 **S 15 H**	1,75	1,20	151x137x100	175x180x212	112x103x50	2,1
S 30 **S 30 H**	2,75	1,90	240x137x100	300x179x214	198x106x50	3,3
S 40 **S 40 H**	4,25	3,20	240x137x150	300x179x264	190x105x75	4,0
S 60 **S 60 H**	5,75	4,3	300x151x150	365x186x264	255x115x75	5,1
S 70 **S 70 H**	6,90	5,2	505x137x100	568x179x214	465x106x50	5,6
S 80 **S 80 H**	9,4	7,3	505x137x150	568x179x264	455x106x75	6,4
S 100 **S 100 H**	9,50	7,50	300x240x150	365x278x264	255x200x80	5,9
S 120 **S 120 H**	12,75	9,00	300x240x200	365x278x321	250x190x115	7,5
S 180 **S 180 H**	18,00	12,90	327x300x200	390x340x321	280x250x115	8,5
S 300 **S 300 H**	28,00	20,60	505x300x200	568x340x321	455x250x115	11,0
S 450 H	45,00	35,00	500x300x300	615x370x467	455x270x194	25,0
S 900 H	90,00	75,00	600x500x300	715x570x467	545x450x250	42,0

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	Mains voltage unit variants (Vac)	Ultrasound frequency (kHz)	Power consumption total (W)	Ultrasonic power RMS (W)	Ultrasonic maximum peak power* (W)	Heating power (W)
S 10	100-120 220-240	37	30	30	240	0
S 10 H			90			60
S 15	100-120 220-240	37	30	35	280	0
S 15 H			95			60
S 30	100-120 220-240	37	80	80	320	0
S 30 H			280			200
S 40	100-120 220-240	37	140	140	560	0
S 40 H			340			200
S 60	100-120 220-240	37	150	150	600	0
S 60 H			550			400
S 70	100-120 220-240	37	150	150	600	0
S 70 H			750			600
S 80	100-120 220-240	37	150	150	600	0
S 80 H			750			600
S 100	100-120 220-240	37	150	150	600	0
S 100 H			550			400
S 120	100-120 220-240	37	200	200	800	0
S 120 H			1000			800
S 180	100-120 220-240	37	200	200	800	0
S 180 H			1000			800
S 300	100-120 220-240	37	300	300	1200	0
S 300 H			1500			1200
S 450 H	200-240	37	2000	400	1600	1600
S 900 H	200-240	37	2800	800	3200	2000

* S 10 – S 15 H: impulse wave form; S 30 – S 900 H: standard sine-wave modulation
The choice of the waveform has been matched to the relevant tank size. The signal form of the wave results in a factor 4 or 8 for the ultrasonic peak max., depending on the modulation of the wave.

11 Trouble shooting

Fault	Possible cause	Remedy
Casing damaged	• damage by third party, transport damage	• return unit to supplier or manufacturer
Mains cable damaged	• damage by third party, transport damage	• obtain original spare mains cable from manufacturer or supplier
No operating functions; all LEDs dark	• mains cable not plugged in	• plug in mains cable
	• socket dead	• check socket/fuse
	• mains cable damaged/interrupted	• replace mains cable
	• fault of electronics	• return unit to supplier or manufacturer
No ultrasonic function; LED ultrasound dark	• turning knob for ultrasonic operation in „0“ position	• switch on the turning knob for ultrasonic operation
	• unit is switched off	• switch on the unit at key on/off
	• key ►■ (ultrasound) not pressed	• press key ►■
	• fault of electronics	• return unit to supplier or manufacturer
No ultrasonic operation; LEDs of LED cleaning period blink alternately ("running light") = fault indication ultrasound	• adverse filling level	• change filling level, switch unit and off and on
	• fault of electronics	• switch unit off and on if fault is indicated again: return unit to supplier or manufacturer
Unsatisfactory cleaning results	• no or unsuitable cleaning medium used	• use suitable cleaning medium
	• cleaning temperature not sufficient	• heat up cleaning liquid
	• cleaning period too short	• repeat cleaning interval

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Fault	Possible cause	Remedy
Unit does not heat up; LED temperature dark	• turning knob temperature in „0“ position	• switch on turning knob temperature
	• unit is switched off	• switch on unit with key on/off
	• fault of electronics	• return unit to supplier or manufacturer
No heating function; LEDs of LED temperature blink alternately ("running light") = fault indication heating	• fault of electronics	• switch unit off and on if fault is indicated again: return unit to supplier or manufacturer
Unsatisfactory heating-up period	• loss of heating energy	• use cover (optional accessory equipment)
	• no mixing of cleaning liquid	• e.g. switch on ultrasound (see section 7.2)
Unit produces boiling noise during heating-up	• no mixing of cleaning liquid	• e.g. switch on ultrasound (see section 7.2)
Set temperature is exceeded	• temperature sensor does not measure the average temperature (no revolution)	• mix liquid manually or by means of ultrasound
	• set temperature too low, ultrasonic energy heats up the liquid more than required (physical process)	• for low set temperatures do not switch on heating
		• switch on ultrasound for short periods only
No operational functions; LEDs of LED ultrasound and LED temperature blink alternately ("running light") = fault indication programme control	• fault of electronics	• switch unit off and on if fault is again indicated: return unit to supplier or manufacturer

12 Putting out of action and waste disposal

The unit can be taken to metal and electronics recycling stations or returned to the manufacturer.

13 Manufacturer's contact address

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Please visit our homepage. You will find helpful information and descriptions on our large product range:

www.elma-germany.com

Do you have any queries or suggestions concerning the present unit, its operation or the Operating Instructions?
Please contact us, we will be glad to assist:

Technical Support

Phone +49 (0) 7731 / 882-280
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Subject to technical and visual modifications. Elma_ch_1105

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